fasciotomy. Better demarcation of non-viable tissue makes for precise debridement, and only at this stage may discrimination between a potentially salvageable and an irretrievably damaged limb become clear. Restoration of skeletal integrity will safeguard subsequent vessel repair. The debate over whether artery or vein is repaired first is rendered obsolete. A compound vein graft, matching the calibre of the host vessel,[1-3 6-9] or an extra-anatomic vein graft bypassing an open contaminated wound may be constructed at leisure.[9 10]

These improvements in managing vascular injuries represent dividends from an experience in which the victims of inhumanity have been the key contributors. The hope remains that "one day the people of peace will come into their own in Northern Ireland."[20]

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1 Livingston RH, Wilson RI. Gunshot wounds of the limbs. *BMJ* 1975;i:667-9.
2 Barros D'Sa AAB, Hassard TH, Livingston RH, Irwin JWS. Missile induced vascular trauma. *Injury* 1980;**12**:13-30.
3 Johnston GW, Barros D'Sa AAB. Injuries of civil hostilities. In: Carter DC, Polk HC, eds. *Surgery* Vol 1. *Trauma*. London: Butterworths, 1981:284-301. (International medical reviews.)
4 Hughes CW. Arterial repair during the Korean war. *Ann Surg* 1958;**147**:555-61.
5 Rich NM, Baugh JH, Hughes CW. Acute arterial injuries in Vietnam: 1,000 cases. *J Trauma* 1970;**10**:359-69.
6 Barros D'Sa AAB. A decade of missile-induced vascular trauma. *Ann R Coll Surg Engl* 1981;**64**: 37-44.
7 Barros D'Sa AAB. How do we manage acute limb ischaemia due to trauma? In: Greenhalgh RH, Jamieson CW, Nicolaides AN, eds. *Limb salvage and amputation for vascular disease*. London: Saunders, 1988:135-50.
8 Barros D'Sa AAB. The rationale for arterial and venous shunting in the management of limb vascular injuries. *Eur J Vasc Surg* 1989;**3**:471-4.
9 Barros D'Sa AAB. Upper and lower limb vascular trauma. In: Greenhalgh RM. *Vascular surgical techniques*. London: Baillère Tindall, 1989:47-65.
10 Barros D'Sa AAB. Complex vascular and orthopaedic limb injuries. *J Bone Joint Surg [Br]* 1992;**74**:176-8.
11 Graham ANJ, Barros D'Sa AAB. Missed arteriovenous fistulae and false aneurysms in penetrating lower limb trauma: relearning old lesions. *Injury* 1991;**22**:179-82.
12 O'Reilly MJG, Hood JM, Livingston RH, Irwin JWS. Penetrating injuries of the popliteal artery. *Br J Surg* 1978;**65**:789-92.
13 Smith RF, Elliot JP, Hageman JH, Szilagyi DE, Xavier AO. Acute penetrating arterial injuries of the neck and limbs. *Arch Surg* 1974;**109**:198-205.
14 Barros D'Sa AAB. Arterial injuries. In: Eastcott HHG, ed. *Arterial surgery*. London: Churchill Livingstone, 1992:355-411.
15 Brawley RK, Murray GF, Crisler C. Management of wounds of the innominate, subclavian and axillary vessels. *Surg Gynecol Obstet* 1970;**131**:1130-40.
16 Halpern NB, Aldrete JS. Factors influencing mortality and morbidity from injuries to the abdominal aorta and inferior vena cava. *Am J Surg* 1979;**137**:384-5.
17 Walker AJ, Mellor SG, Cooper GJ. Experimental experience with a temporary intraluminal heparin bonded polyurethane arterial shunt. *Br J Surg* 1994;**81**:195-8.
18 Sirinek KR, Gaskill HV, Dittman WI, Levine BA. Exclusion angiography for patients with possible vascular injuries of the extremities—a better use of trauma centre resources. *Surgery* 1983;**94**:598-603.
19 Doty DB, Treiman RL, Rothschild PD, Gaspar MR. Prevention of gangrene due to fractures. *Surg Gynecol Obstet* 1967;**125**:284-5.
20 Eames R. *Chains to be broken. A personal reflection on Northern Ireland and its people*. London: Weidenfeld and Nicolson, 1992:176.

Immunisation against chickenpox

Better to confine immunisation to those at high risk

There are three main arguments for universal immunisation against chickenpox in childhood. Firstly, immunisation is good for the children who are immunised; secondly, it is good for immunocompromised children, who will be protected from exposure to children with chickenpox; and, finally, it is cost effective because fewer parents need to take time off to take care of children with chickenpox. In our view, these arguments are not powerful enough to justify universal immunisation.

The natural course of chickenpox is well defined. Most reported cases occur in children under 10, who usually develop a vesicular rash that erupts in clusters and scabs over one week and causes troublesome itching. It is often associated with mild fever and other systemic symptoms. In older patients pneumonia is the most common complication, but bacterial superinfection, meningoencephalitis, and glomerulonephritis may also occur. Death or long term illness from primary chickenpox in immunocompetent children is exceedingly rare. At present, then, chickenpox is a benign illness.

Chickenpox in adults may be much more severe. During the first two trimesters of pregnancy it may result in chickenpox embryopathy. In the last trimester it may result in neonatal chickenpox, which, if severe, may be associated with a mortality as high as 30%.[1] Immunocompromised patients are also at risk of serious infection. It is hard to isolate immunocompromised children from community outbreaks of chickenpox because children can transmit the disease several days before they become clinically ill. To protect immunocompromised children, doctors often recommend that healthy recuperating children should be kept out of school until all lesions have scabbed over, even if they do not feel ill.

The main problem with immunisation is that we do not know whether children who are immunised with chickenpox vaccine develop lifelong immunity. In immunocompromised children immunity persists in most of those who have been immunised for at least six years,[2 3] but long term immunity is thought to require re-exposure to natural infection or reimmunisation. If the protective effect of immunisation wanes a programme of universal immunisation may create a population of adults who are at risk of serious illness and thus turn a relatively benign childhood illness into a major cause of illness and teratogenicity.

Most childhood immunisations, such as those against *Haemophilus influenzae* type b infection or pertussis, protect each child as well as promote herd immunity. Universal immunisation programmes benefit all children by protecting them from illnesses that can be severe in those who are young. Even if immunity wanes, infection during adulthood usually leads to less severe disease. By contrast, chickenpox in young healthy children is quite mild, whereas primary infection during adulthood can be severe. Thus the benefits to most children from chickenpox immunisation would be minimal: the benefits accrue only to immunocompromised children.

A programme of universal immunisation to benefit immunocompromised children would require doctors to ask parents to authorise the immunisation of their children not for their own benefit but for the benefit of their less fortunate classmates. Parents would be asked to place their children at potentially increased risk of primary chickenpox as adults. This is compulsory altruism. Given that we do not compel adults to serve as kidney or even blood donors, it seems unfair to require children to be "splendid Samaritans."[4] This also contradicts the "best interest of the child" standard, which is the usual guiding principle for parental decision making.

If the goal of chickenpox immunisation is to protect immunocompromised children other strategies should be used. One option is to immunise high risk children—and the chickenpox vaccine has been given successfully to immunocompromised children.[5 6] These children can be further protected by the use of varicella zoster immune globulin

and acyclovir. While these children and their parents may desire the increased protection of community immunity, the increased risks that such immunity entails for otherwise healthy children cannot be justified.

The costs of chickenpox infection are partly the medical expenses and partly the days of work lost among families. The medical expenses are generally low. Studies have shown that universal chickenpox immunisation is not cost effective in terms of health costs alone.[7,8] These studies may even underestimate the costs, because they do not account for the possible increase in costs if universal immunisation delays disease until adulthood.

The cost of days of work lost by parents because of their children's chickenpox is substantial, and universal chickenpox immunisation would probably be cost effective from this angle.[8,9] A large part of the cost, however, is due to policies of isolation. We believe that this cost is avoidable; if it was avoided this might tip the balance of the cost-benefit studies against universal chickenpox immunisation. Children should not have to stay home while asymptomatic but still capable of transmitting the disease. This policy, which is justifiable primarily on the basis of its benefit to immunocompromised children, in fact offers such children false security since they are still exposed to children who are presymptomatic but are capable of transmitting the disease. The best way to protect immunocompromised children is to immunise them, not all their peers.

A policy of mandatory universal immunisation would be justified only if the benefits of participation for each individual outweighed the risks and costs. Given the mild course of chickenpox in healthy children, such a policy is not justified. Chickenpox immunisation should be recommended only to families in which one or more members are at high risk of serious infection.

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1 American Academy of Pediatrics, Committee on Infectious Diseases. *1994 Red Book*. Elk Grove Village, Illinois: AAP, 1994:511.
2 Watson B, Gupta R, Randall T, Starr SE. Persistence of cell-mediated and humoral responses in healthy children immunized with varicella vaccine. *J Infect Dis* 1994;**164**:197-9
3 Asano Y, Nagai T, Miyata T, Yazaki T, Ito S, Yamanishi K, *et al.* Long-term protective immunity of recipients of the OKA strain of varicella vaccine. *Pediatrics* 1985;**75**:667-71.
4 Thomson JJ. A defense of abortion. *Philosophy and Public Affairs* 1971;**1**:47-66.
5 Gerson AA. Immunizations for pediatric transplant patients. *Kid Int Suppl.* 1993;**43**:S87-90.
6 Zamora I, Simon JM, Da Silva ME, Piqueras AI. Attenuated varicella virus vaccine in children with renal transplants. *Pediatr Nephrol* 1994;**8**:190-2.
7 Preblud SR, Orenstein WA, Koplan JP, Bart KJ, Hinman AR. A cost-benefit analysis of a childhood varicella vaccination programme. *Postgrad Med* 1985;**61**:17-22.
8 Lieu TA, Cochi SL, Black SB, Halloran ME, Shinefield HR, Holmes SJ, *et al.* Cost-effectiveness of a routine varicella vaccination program for US children. *JAMA* 1994;**271**:375-81.
9 Huse DM, Meissner HC, Lacey MJ, Oster G. Childhood vaccination against chickenpox: an analysis of benefits and costs. *J Pediatr* 1994;**124**:869-74.

Thrombolysis in patients with diabetes

Withholding treatment is probably mistaken: patients should be given a choice

Any junior doctor treating a patient with diabetes mellitus and an acute myocardial infarction faces a dilemma. Lists of cautions and contraindications for thrombolytic treatment usually include diabetic retinopathy. The reasonable fear of precipitating a vitreous or retinal haemorrhage helps to explain why fewer diabetic than non-diabetic patients are given thrombolysis.[1,2] Funduscopy is not, however, easy in a brightly lit receiving room after the administration of opiates. Even after mydriatic drops are given it may not be possible definitely to exclude changes in the eye. The next hurdle to face after making the decision to give thrombolysis—or not—is to justify one's actions on the post-take ward round.

The *British National Formulary* states that diabetic retinopathy is a contraindication to thrombolysis, although this will be changed to a caution in future editions. The datasheets from drug manufacturers vary from making no mention of diabetes (anistreplase, Boehringer) through advising special caution in the presence of diabetic proliferative retinopathy (alteplase, Boehringer) to stating that thrombolysis is contraindicated in severe diabetes mellitus (streptokinase, Hoechst) or in diabetic retinopathy (streptokinase, Pharmacia). Junior doctors must find it difficult to give a drug when its use is directly contraindicated in the *British National Formulary*.

Against that background the lack of published case reports is surprising. We have been able to find one account of bleeding from retinopathy in a single diabetic patient after thrombolysis[3] and one other of ocular haemorrhage after streptokinase in a patient without diabetes.[4] In neither case was there any long term effect on vision. The Committee on Safety of Medicines has received one report of subconjunctival haemorrhage associated with streptokinase. In a published overview of fibrinolytic trials in patients with myocardial infarction the proportionate reduction in 35 day mortality was slightly, but not significantly, greater in diabetic patients (136/1000 *v* 173/1000; 21·7%) than in non-diabetic patients (87/1000 *v* 102/1000; 14·3%).[5] These figures imply that, for every 1000 diabetic patients treated, 37 patients survive who would otherwise have died. The overview of fibrinolysis found no evidence of excess bleeding or stroke in the diabetic patients. One small study suggested an excess risk of haemorrhagic complications in diabetic patients aged over 75,[6] but in an analysis of over 9000 patients treated with thrombolysis, of whom a tenth had diabetes, complication rates were similar in the diabetic and non-diabetic patients.[7]

Among the large trials of thrombolytic treatment only that conducted by the Gruppo Italiano per lo Studio della Streptochinasi nell'Infarto Miocardico included haemorrhagic diabetic retinopathy as a contraindication to treatment,[8] while the second[9] and third[10] international studies of infarct survival and the study by the Gruppo Italiano per lo Studio della Sopravvivenza nell'Infarto Miocardico[11] made no mention of diabetes, with or without retinopathy, in their exclusion criteria. In these trials alone more than 80 000 patients, of whom around 11% had diabetes, received thrombolytic treatment, without any reports of detrimental effects in their eyes. In a subgroup analysis of the thrombolysis and angio-